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USE OF DDT IN CONTROL OF FLIES ON CATTLE AND AROUND FARM BUILDINGS

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Division of Insects Affecting Man and Animals

The advent of DDT and the formulations of this chemical into insecticides have provided particularly effective methods for reducing fly infestations on cattle and in farm buildings. Three species of flies commonly found about farm buildings are annoying to cattle and are responsible for spoiling valuable dairy products by contaminating them with micro-organisms. Of these three--the housefly, the stablefly, and the horn fly--the greatest offender is the housefly, which feeds on body excretions of animals and lays its eggs in manure and decaying refuse. The stablefly, known in some localities as the dog fly, feeds upon the blood of animals and lays its eggs in fermenting plant products. The horn fly, a much smaller species than the other two, occurs in swarms on animals, feeds on blood, and lays its eggs only on fresh cow manure.

In any attempt to control these three species of flies it is first necessary to practice sanitation as thoroughly as possible and to remove possible sources of infestation. 1/ No insecticide alone can be expected to eradicate all individuals of an insect species. The use of DDT in any of the preparations described below to supplement the control through elimination of breeding places will, however, materially reduce these flies around livestock and farm buildings. DDT is not effective in killing fly larvae.

DDT sprays made and used according to the suggestions given will usually continue to kill horn flies on cattle for 10 to 15 days after the first application and for 2 to 3 weeks or longer following the second application. Stableflies are more resistant to DDT than houseflies and horn flies. When carefully used on surfaces, residual sprays will kill for several months flies, mosquitoes, and a few other insects that crawl over the treated surfaces.

Preliminary tests with DDT against horse flies and deer flies, also severe pests of cattle, were not promising, and the use of DDT insecticides to control these pests is not recommended at this time.

Types of DDT Insecticides

DDT must be prepared in a suitable formulation before it can be used as an effective insecticide. At the present time there are available commercially aerosols, dusts or powders, solutions, emulsion con-

1/ Bishopp, F. C. Housefly control. U.S.Dept. Agr. Leaflet 182, 6 pp. 1939.

centrates, and water-dispersible powders, all of which contain DDT. Most of these, if used according to directions, will produce the desired results. No doubt best results will be obtained by buying formulated DDT preparations rather than trying to mix them at home.

An aerosol containing about 0.4 percent of pyrethrins and about 3 percent of DDT is very effective in killing adult flies, gnats, mosquitoes, and a few other flying insects in dairies, stables, poultry houses, and residences.

Dusts or powders containing from 5 to 10 percent of DDT in diluents such as talc and pyrophyllite will kill flies and mosquitoes within buildings, as well as flies and lice on cattle and other livestock. DDT should not be mixed with lime as a diluent.

DDT can be dissolved in comparatively few readily available solvents which can be used with reasonable safety. The most convenient solvents are various grades of kerosene and fuel oil. For those who wish to make their own solutions 7 ounces of technical grade DDT can be dissolved in 1 gallon of kerosene to make a 5-percent DDT solution. Highly refined greaseless kerosene will not dissolve so much DDT, and the fuel oils will dissolve a little more than common kerosene. DDT should not be used in gasoline.

An emulsion concentrate is a liquid which on dilution with water gives a suitable spray for certain purposes. A very satisfactory concentrate for making DDT emulsions contains 25 percent of technical grade DDT, 65 percent of xylene, and about 10 percent of a wetting agent such as Triton X-100 (polyethylene glycol phenylisooctyl ether). One part of this concentrate diluted with 4 parts of water makes a 5-percent DDT emulsion.

The most recent work on residual sprays has led to the development and use of water-dispersible DDT powders, which are now manufactured by several companies. A satisfactory DDT suspension can be made by mixing a water-dispersible powder containing 50 percent of DDT at the rate of 2 pounds to 5 gallons of water. This mixture contains about 2.5 percent of DDT. If a 25-percent powder is used, 4 pounds should be mixed with 5 gallons of water to obtain the same spray concentration.

Use of DDT in Aerosols

For best results in using DDT in aerosols the doors and windows of rooms should be closed during treatment and for about 30 minutes thereafter. The aerosol fog should be directed toward the center and top of the room rather than at the walls. A few seconds' release of the fog is sufficient for rooms containing a few thousand cubic feet of air space (see directions on containers).

Since practically no residue is built up on the walls of rooms treated with aerosols, treatment is effective only as long as the toxic agents are in the air, a matter of a few hours. After that period flies can enter aerosol-treated rooms without being affected. Aerosols are of no value in killing flies on livestock unless the animal is in a closed room.

When aerosols are used in dairies or where food for man or animal use is stored, care should be taken to cover equipment and food to prevent contamination by the insecticide. Care should be taken that young chickens do not have an opportunity to eat flies that drop to the floor when aerosols are used.

Use of DDT in Dusts

Dusts containing 5 to 10 percent of DDT may be applied to livestock and farm buildings by means of hand- or power-operated equipment. About 2 ounces of dust is sufficient to treat an adult cow or horse, and for a light application to walls and window sills within a room 12 feet square. Although DDT applied in this form is fairly effective against flies and mosquitoes for a few days, it is not generally recommended for use within homes, because the dust deposit is unsightly and its effect is less persistent than that of sprays.

Use of DDT in Oil Solutions

A spray containing 5 percent of DDT in oil is very effective against flies, gnats, bedbugs, and mosquitoes, and the residue persists for a long time in killing these insects if they crawl over treated surfaces. DDT in a refined, greaseless kerosene may also be applied to the interior walls and ceilings of homes.

DDT solutions can be applied by means of hand- or power-operated sprayers. About 1 gallon to 1,000 square feet of surface is a suitable rate of application, although this will vary greatly with the kind of surface treated. A light spray or one containing less than 5 percent of DDT may be effective for short periods, but is not fully satisfactory or economical. In general the surface should be thoroughly wet, but not so wet that the liquid will run off. Oil sprays are easily absorbed on some surfaces, and some of the DDT may be lost.

Use of DDT in Emulsions

The 5-percent DDT emulsion also gives an effective and persistent residue against flies, mosquitoes, and certain other insects when applied at the rate of about 1 gallon per 1,000 square feet of surface.

A 2.5-percent or even a 5-percent DDT emulsion may be applied as a spray to parts of an animal, such as the belly, rump, and back, where horn flies frequently rest. About 1 quart, never more, should be used for an adult cow or horse. If used as a dip, and dips are feasible

when a large number of animals are treated, the concentrate should be diluted so that the resulting emulsion contains only 0.25 percent of DDT. This strength dip can be made by adding 99 parts of water to 1 part of concentrate containing 25 percent of DDT. About 2 gallons of liquid per individual is required when adult cattle and horses are dipped.

Water-soluble pine oil, or any other oil that contains a suitable wetting agent and 20 percent of technical DDT by weight, can also be diluted to form a safe spray for use on the surfaces of farm buildings, or even as a spray or dip for use on livestock, if diluted strictly according to directions.

Use of DDT in Suspensions

Water-dispersible DDT powders mix easily with water and can be used in regular spray equipment. DDT in these suspensions settles to the bottom of spray equipment, however, and sometimes clogs nozzles adjusted to even a coarse spray. Constant agitation will eliminate this trouble and provide for the delivery of a uniform concentration of spray material.

A persistent residue on farm buildings can be secured by applying 1 gallon of a 2.5-percent DDT suspension to about 300 square feet of surface. This strength suspension may also be used safely on livestock. Individual animals may be sprayed until all the hair is saturated. Large numbers of animals may be sprayed with power sprayers. If animals are dipped in suspensions, however, the mixture should be diluted to about an 0.25-percent strength (1 pound of a 50-percent DDT powder in 25 gallons of water).

Residual sprays containing less than 2.5-percent of DDT in suspension have given satisfactory results in some parts of the country, but in other parts of the United States they have remained effective for very short periods. The reasons for this are not fully understood. Information now available suggests that the residual effects of DDT are impaired by the quality of the sun's rays.

Proper Application of DDT Sprays

Sprays containing DDT are unique in that they continue for several months to kill most of the insects that crawl over surfaces to which they have been applied. They do not repel insects. DDT sprays are not satisfactory space sprays unless used in connection with a rapid-acting toxic material such as pyrethrum. DDT kills slowly; hence immediate results may be disappointing.

When applying DDT sprays to buildings, one should direct them on the favorite resting places of flies, such as portions of ceilings, the walls near doors and windows, cross beams, light cords, and the

areas near food supplies but not on the food. Flies are frequently seen resting outside buildings, on concrete walls and walks in the warm sun. These areas may be sprayed with DDT to good advantage, although the killing residue will not last so long outdoors in strong sunlight as it does indoors in the shade.

Screens can best be treated by using a rag or a sponge saturated with a 5-percent DDT-oil solution.

Any type of sprayer in common use can be adapted for applying DDT residual sprays. Rather large droplets applied at a distance of about 3 feet are best. A nozzle opening about the size of a No. 60 standard wire gage and a pressure of about 40 pounds per square inch give the most desirable spray for walls and ceilings. If smaller nozzle openings are used, the spray should be held near the surface to be treated and the operator should wear a mask because of the fine mist spray.

Recommendations

For controlling flies on individual animals, we prefer to use a 2.5-percent DDT suspension at the rate of about 1 quart per adult animal. For treating large numbers, cattle can be sprayed with power equipment at about the same rate per animal or they may be dipped in a 0.25-percent DDT suspension. For controlling flies in farm buildings we prefer applying a 2.5-percent DDT suspension to the walls, ceilings, and floors at the rate of about 1 gallon per 300 square feet of surface.

DDT emulsions, solutions, and dusts are also effective and safe when used according to directions. When used as residual sprays they should be applied at the rate of about 1 gallon per 1,000 square feet of surface.

For residual effect DDT should be applied to surfaces in the form of a rather coarse or "wet" spray, not as a mist or fog.

DDT with pyrethrum in aerosols is very effective in reducing fly and mosquito populations in closed rooms.

Cautions

DDT should always be used with reasonable caution, because it is a poison. Equipment and utensils used for preparing and storing food should be protected against contact with DDT in any form.

In oils DDT can be absorbed through the skin of man and animals. Although small amounts may not be injurious, one should remove with soap and water residues of insecticides containing DDT which may be deposited on the user. Oil alone may burn animals, even fatally, if used in sufficient quantities to saturate their hair. Oil emulsions

of DDT may be safely used if diluted with water according to recommendations. DDT in aerosols, in dusts, and in water suspension, if used according to recommendations, will offer no appreciable hazard.

Oil sprays also present a fire hazard; therefore, they should be used with caution where this danger is present.

DDT oil emulsions are safe to use where a fire hazard exists because of the large amount of water they contain. The concentrate, however, is very inflammable and of course should not be used on livestock without dilution according to directions.

If large areas are to be treated with DDT formulations, a respirator should be worn by the operator. Persons allergic to pyrethrum or DDT should wear a simple respirator while releasing aerosols.